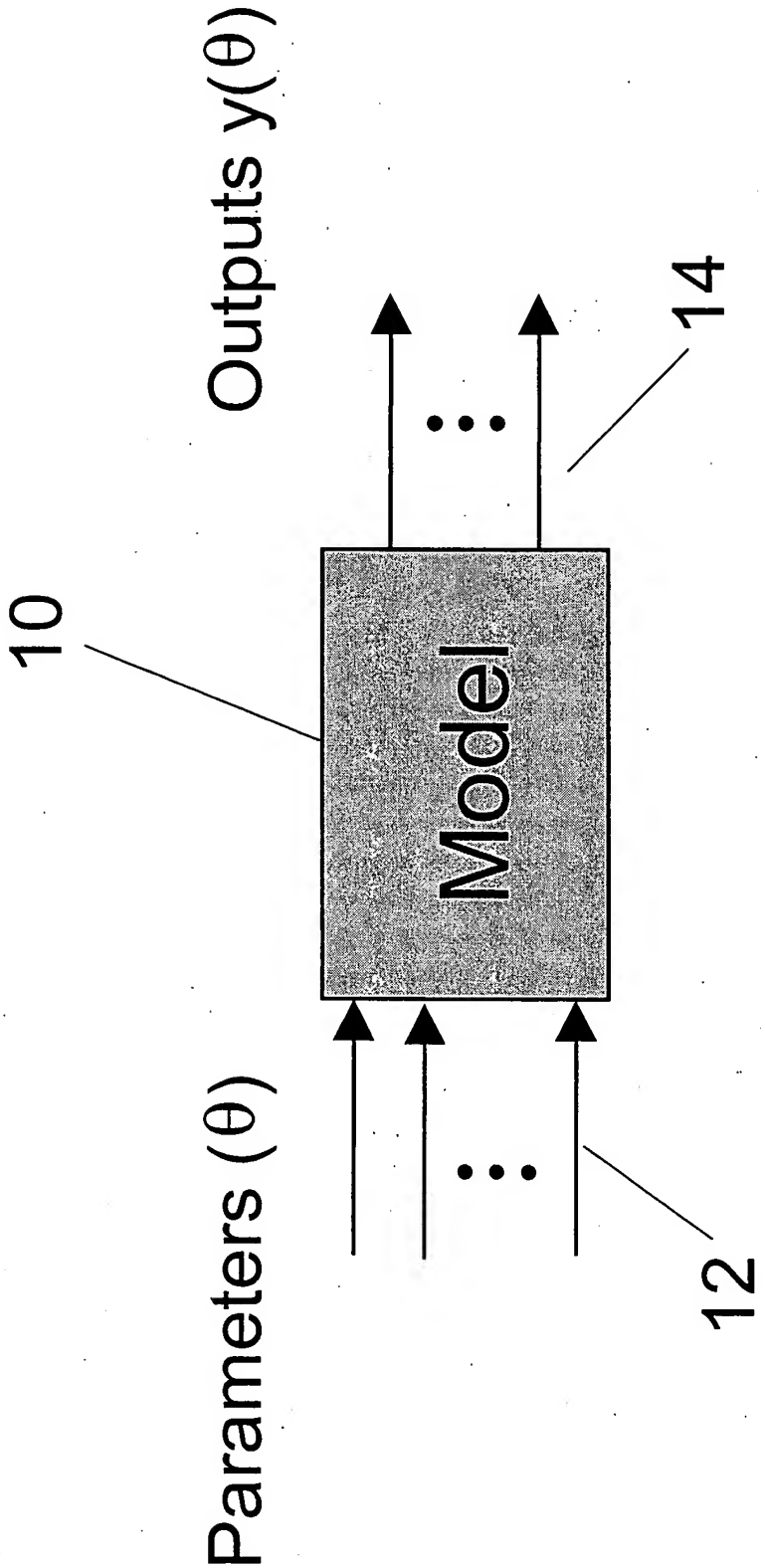

Figure 1

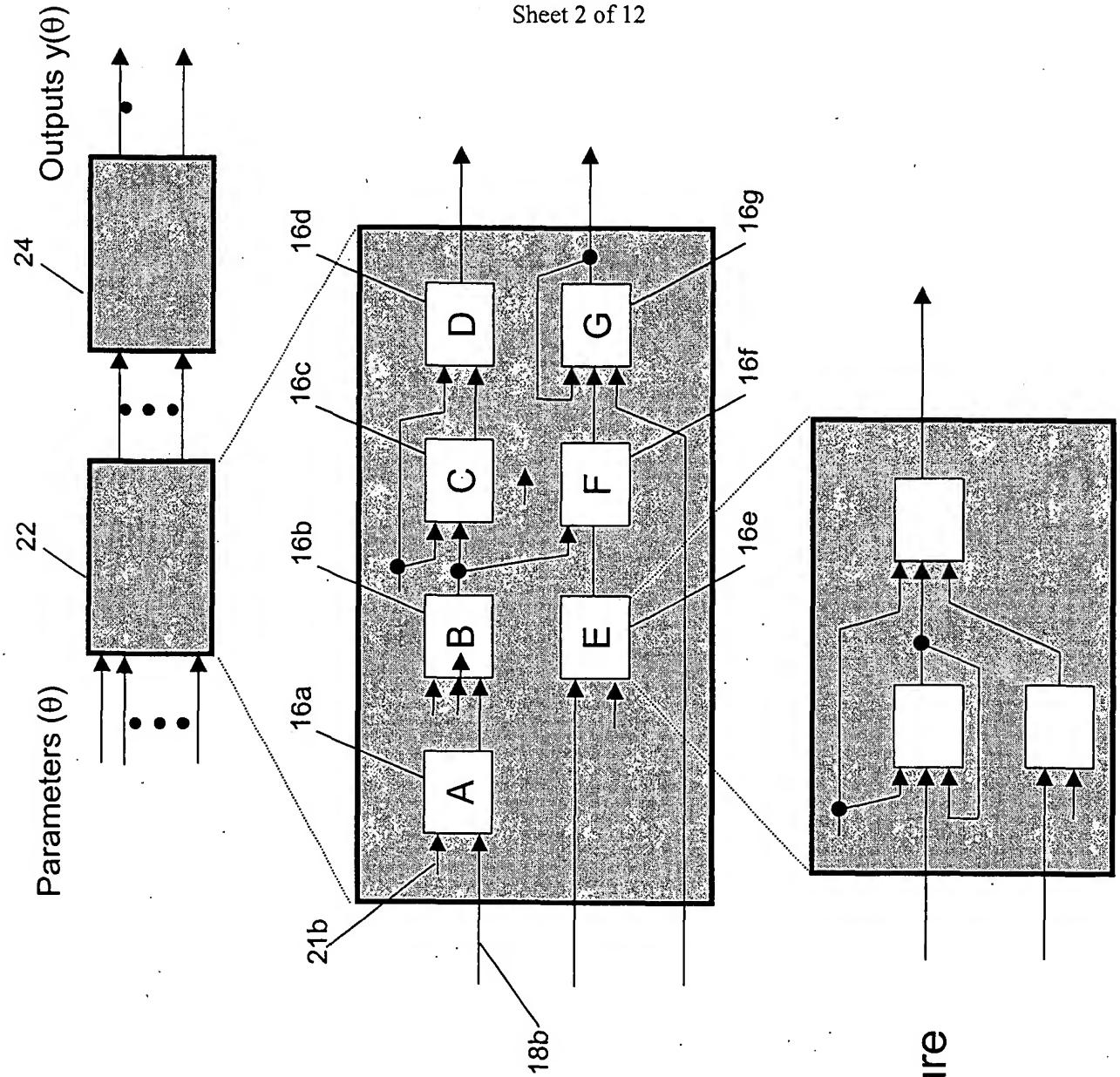
Outputs y(θ)
24
22
Parameters (θ)
16d
16c
16b
16a
16g
16f
16e
A
B
C
D
E
F
G
21b
18b
Linked Models
Refined structure
Further refined structure

Figure 2

Model response for all parameter values i.e. global sensitivity

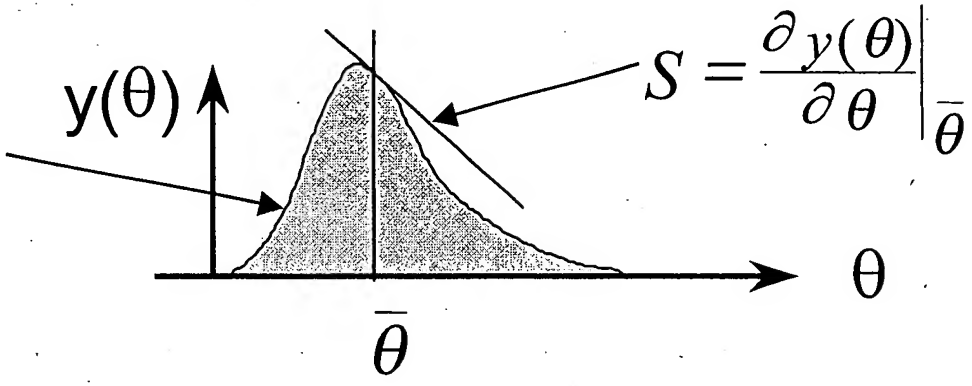

Figure 3A

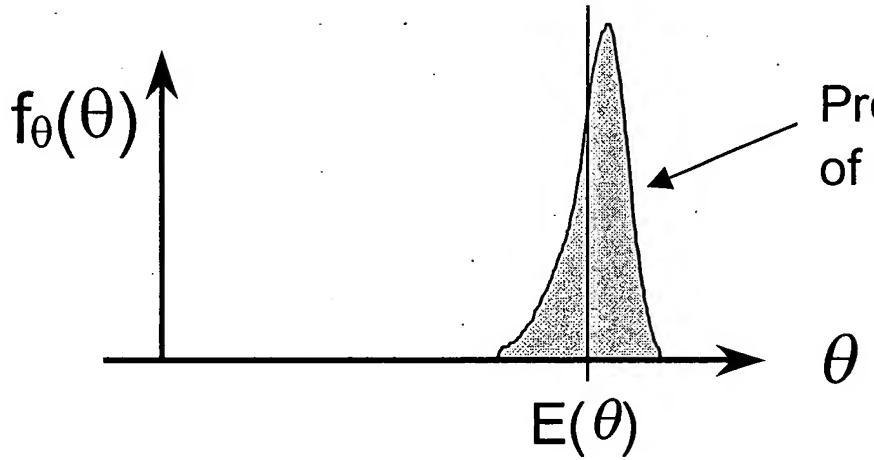

Figure 3B

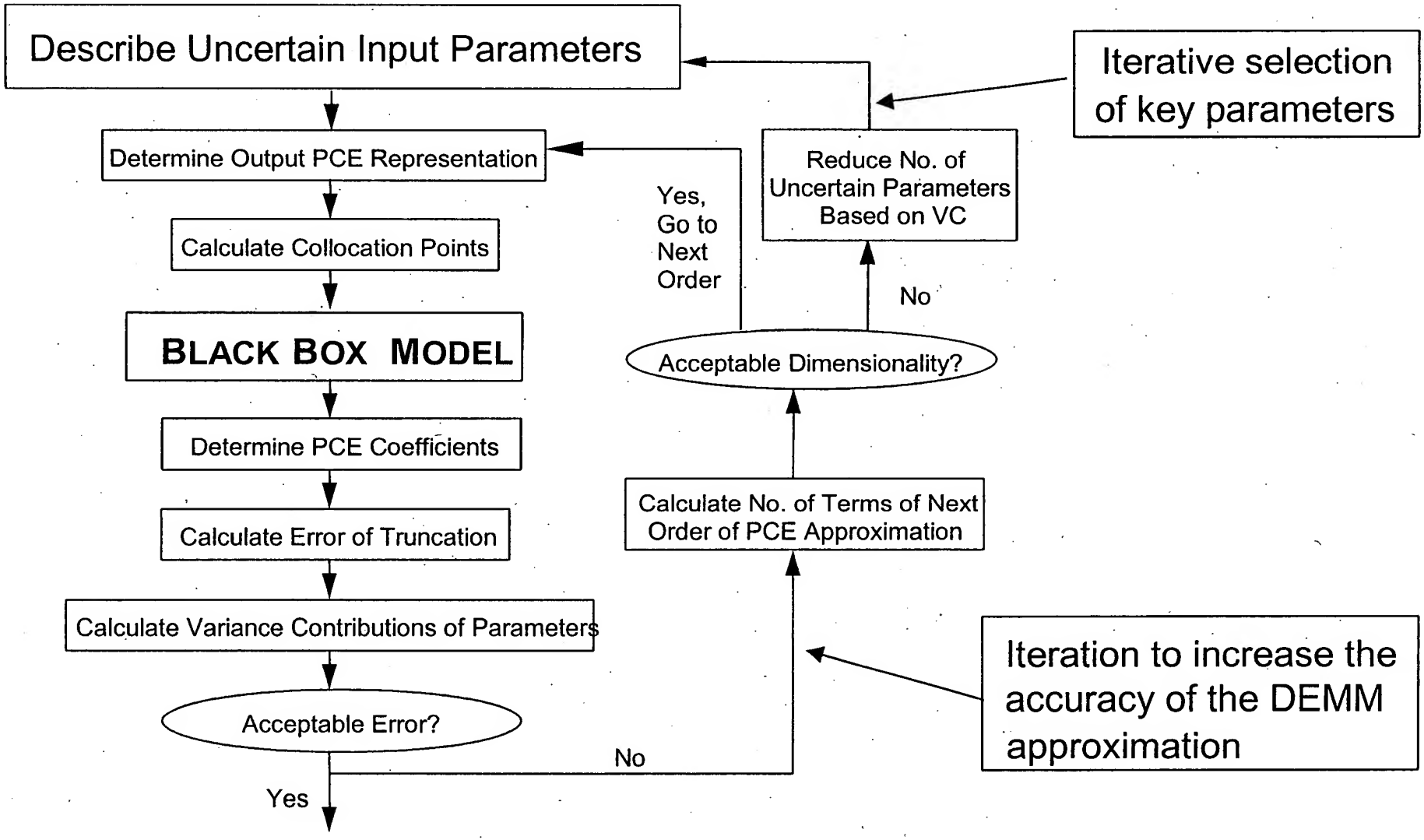
Describe Uncertain Input Parameters
Determine Output PCE Representation
Calculate Collocation Points
BLACK BOX MODEL
Determine PCE Coefficients
Calculate Error of Truncation
Calculate Variance Contributions of Parameters
Acceptable Error?
Yes
No
Calculate No. of Terms of Next Order of PCE Approximation
Acceptable Dimensionality?
Yes, Go to Next Order
No
Reduce No. of Uncertain Parameters Based on VC
Iterative selection of key parameters
Iteration to increase the accuracy of the DEMM approximation

Figure 3C

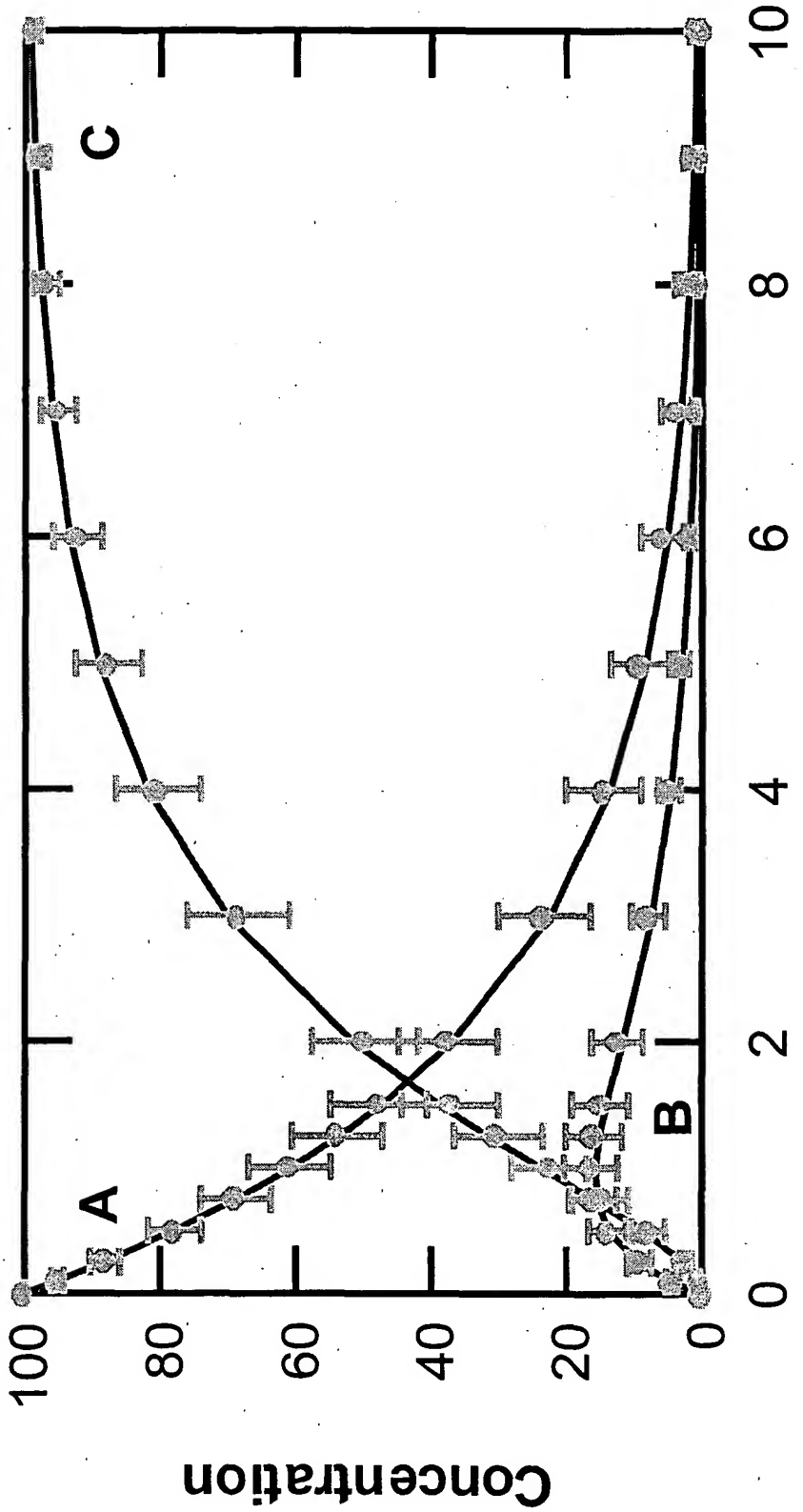

Figure 3D

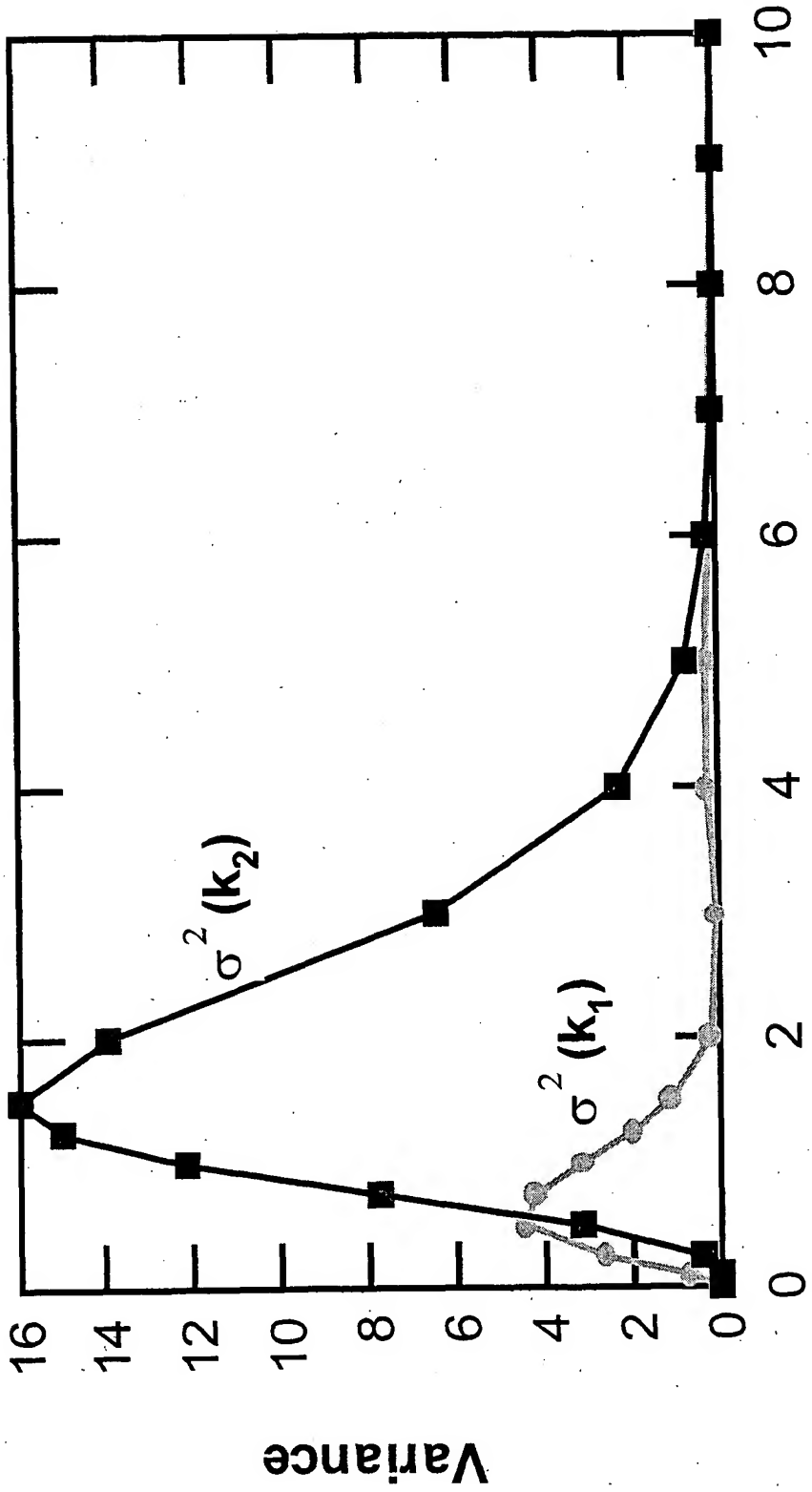

Figure 3E

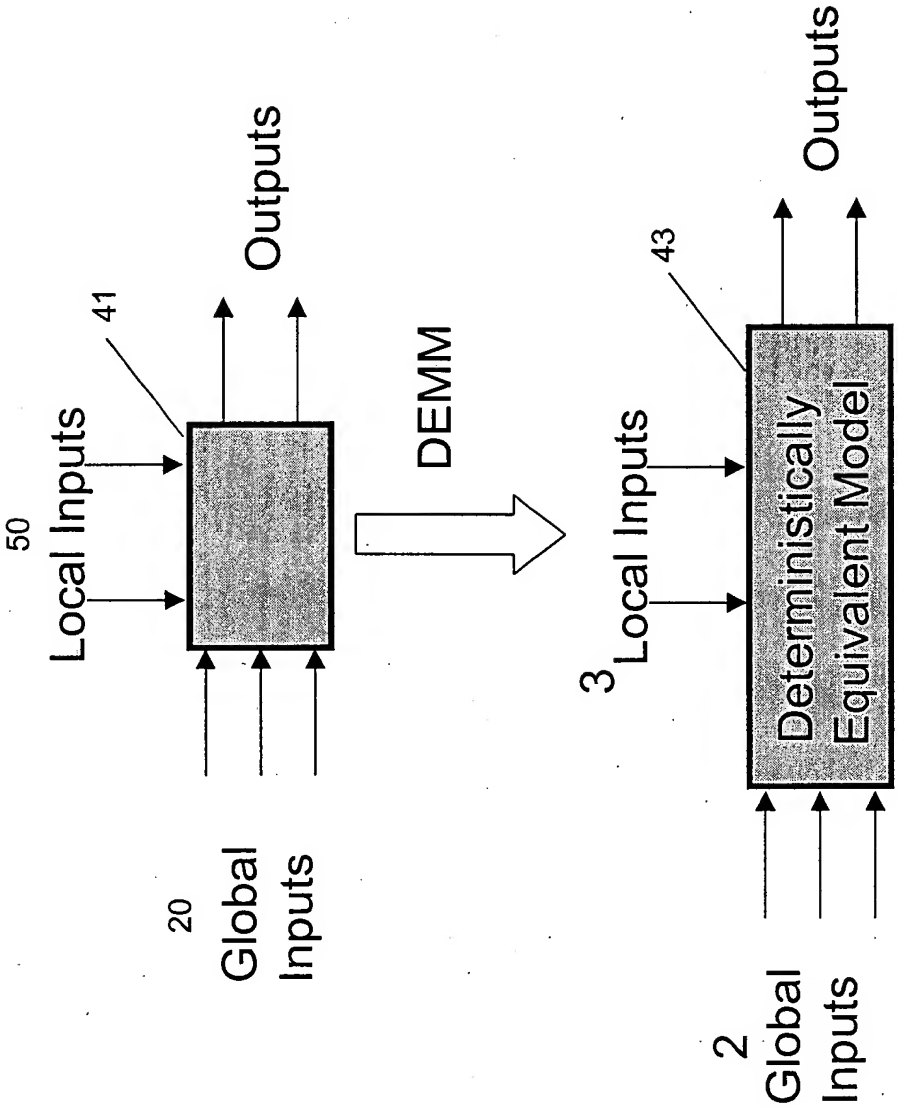
Outputs
41
Local Inputs
50
DEMM
Outputs
43
Local Inputs
3
Deterministically Equivalent Model
20
Global Inputs
2
Global Inputs

Figure 4

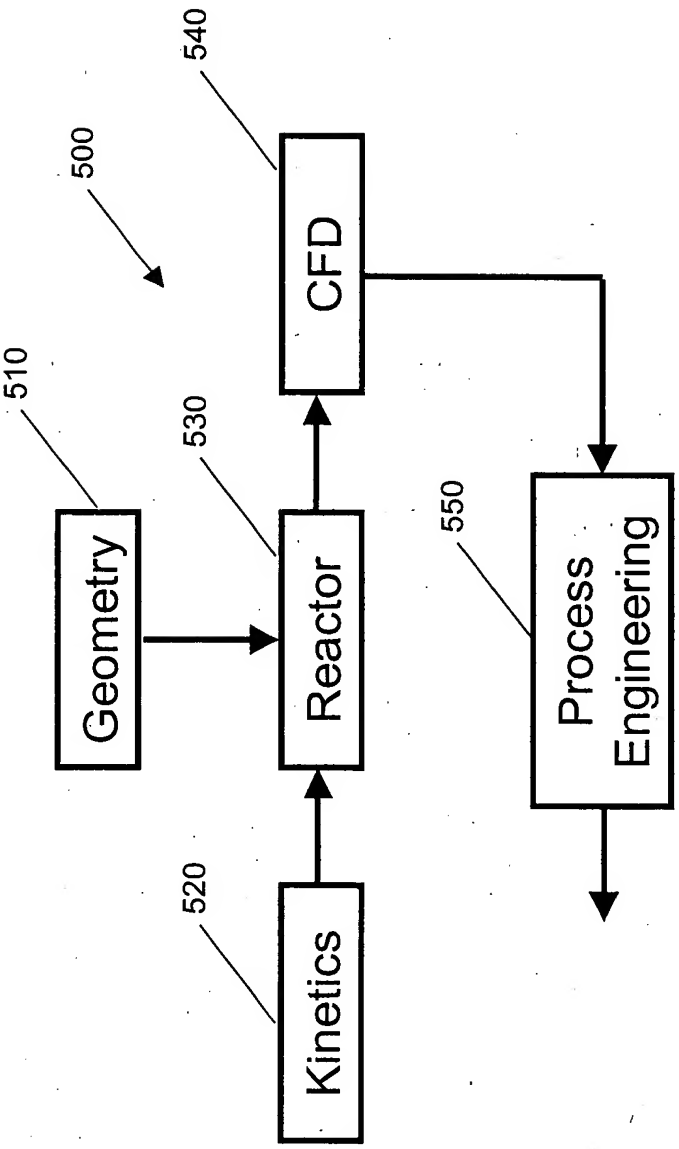
500
510
520
530
540
550
Geometry
Kinetics
Reactor
CFD
Process
Engineering

Figure 5

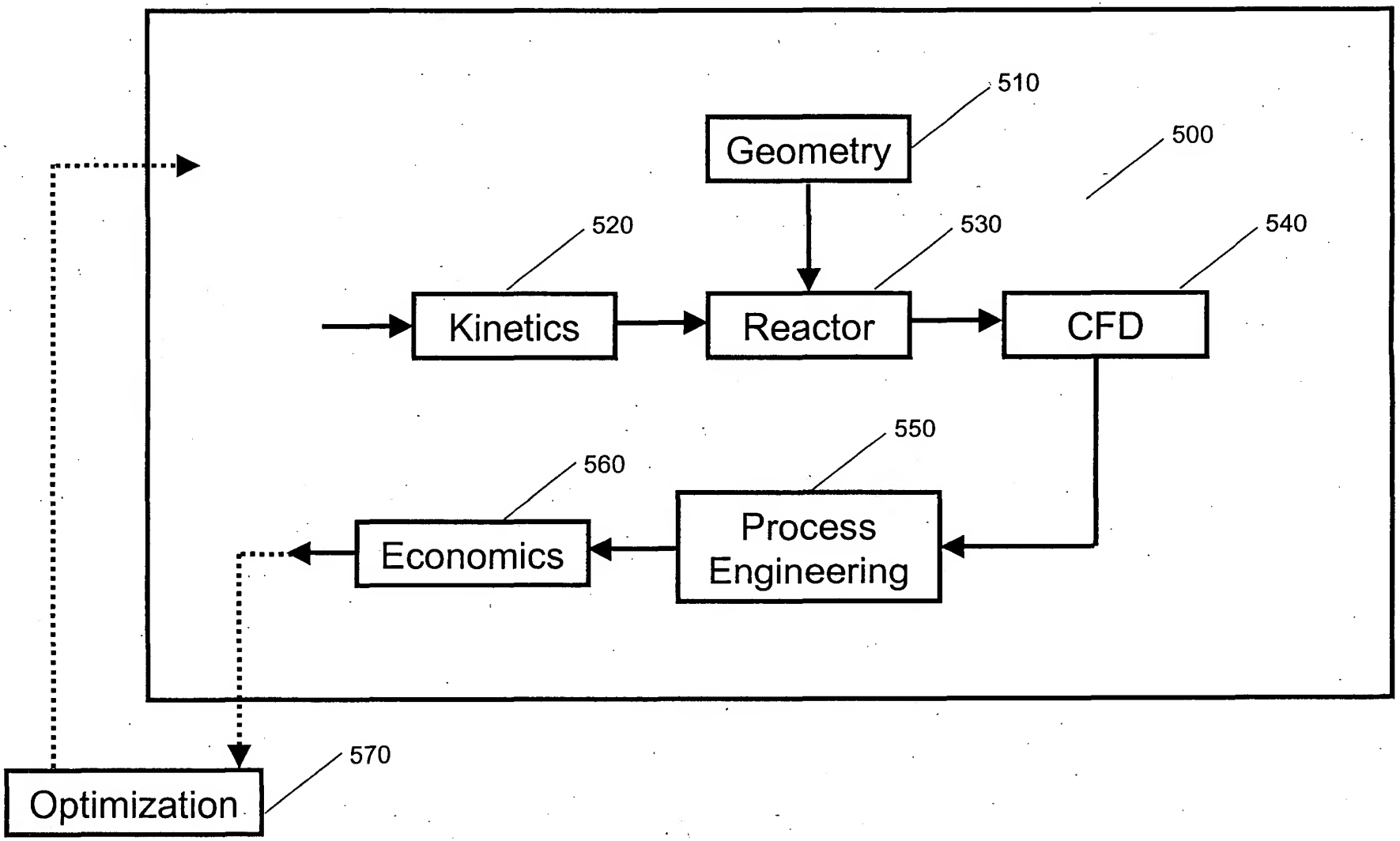
510
Geometry
500
520
530
540
Kinetics
Reactor
CFD
550
560
Process
Engineering
Economics
570
Optimization

Figure 6

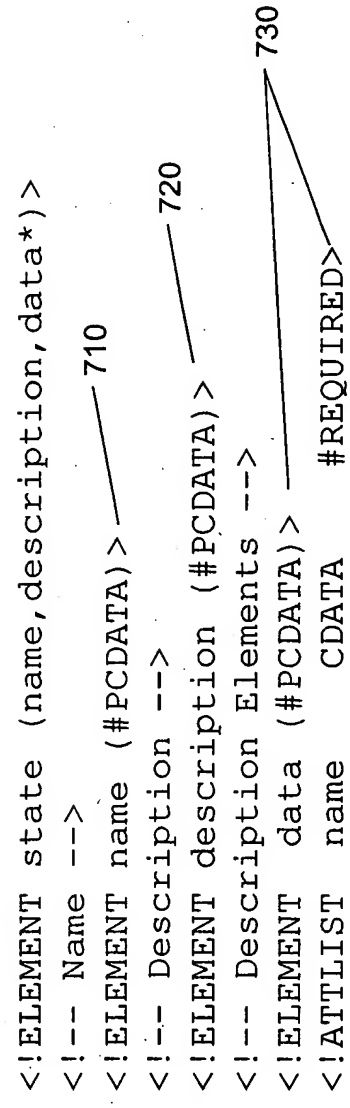
<!ELEMENT state (name,description,data*)>
<!-- Name -->
<!ELEMENT name (#PCDATA)>
<!-- Description -->
<!ELEMENT description (#PCDATA)>
<!-- Description Elements -->
<!ELEMENT data (#PCDATA)>
<!ATTLIST name CDATA #REQUIRED>
710
720
730

Figure 7A

```
<?xml version="1.0" standalone="no" ?>
  <!DOCTYPE state (View Source for full doctype...)>
    <state>
    <name>PDF</name>
    <description>Normal</description>
    <data name="Mean">0.200</data>
    <data name="Stdv">0.001</data>
    </state>
```

Figure 7B

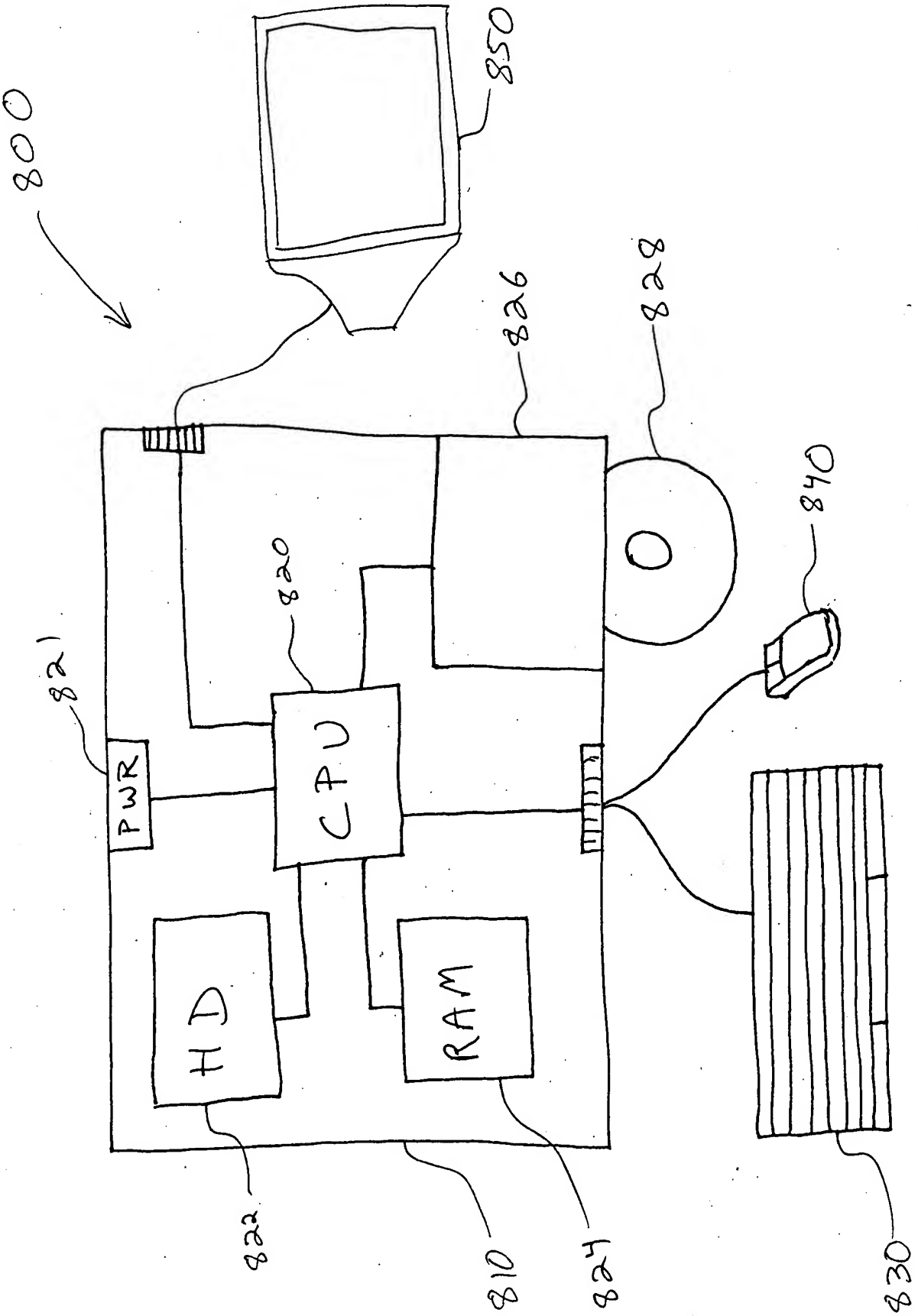

Figure 8